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PATENT SPECIFICATION



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160,474

Complete Left: Jan. 27, 1920.

Complete Accepted: Mar. 31, 1921.

PROVISIONAL SPECIFICATION.

Improvements in and relating to Centrifugal Pumps.

We, JAMES WAREING, 11, Knacks Healey, Rochdale, and ADAM HILL, 43, Cheltenham Street, Rochdale, trading as Aldine Engineering Co., 58, School Lane, Rochdale, do hereby declare the nature of this invention to be as follows:—

A blade A is cast on or fixed to blades B as sectioned on drawings enclosed. To act as a shield against head pressure, also

to entrap the liquid which in rotation of 10
impeller or propeller creates liquid pres-
sure against the narrow aperture C giving
high pressure of delivery. This shield
can be so formed in the narrow aperture
C to deliver at different angles. 15

Dated this 30th day of July, 1919.

J. WAREING.
ADAM HILL.

COMPLETE SPECIFICATION.

Improvements in and relating to Centrifugal Pumps.

We, JAMES WAREING, 11, Knacks
20 Healey, Rochdale, and ADAM HILL, 43,
Cheltenham Street, Rochdale, trading as
Aldine Engineering Co., 58, School Lane,
Rochdale, do hereby declare the nature of
this invention and in what manner the
25 same is to be performed, to be particu-
larly described and ascertained in and by
the following statement:—

These improvements relate to impellers
for centrifugal pumps, which impellers
30 are usually in the form of arc shaped
vanes and are cast on or otherwise secured
upon one of the discs forming a side of
the pump drum. The objects of the
invention are to so form the vanes, as to
25 their shape and juxtaposition within the
pump drum, as to secure the maximum
amount of efficiency from the pump.

In carrying the improvements into
effect we provide a pump drum with arc
40 shape vanes of the usual type, which act
as guides and impellers for the liquid
to be pumped, and which liquid enters the
drum by a central inlet, as usual. Upon

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or near the outer extremity of each vane,
that is, where it approaches the periphery 45
of the pump drum, we cast or otherwise
secure supplementary vanes, of arc shape,
the chord of such arc being approximately
at right angles to the chord of the arc of
the principal vane, this angle varying 50
however according to the number of
impeller chambers in the drum. From
this construction it follows that at the
periphery of the pump drum the extremity
of a supplementary vane approaches 55
closely the extremity of the principal
vane next in position, and chambers are
formed within the drum which chambers
gradually increase in area from the liquid
inlet to a point between the junction of 60
a supplementary vane with its principal
vane and the highest point of the arc
shaped principal vane next in position,
and the shape of the chamber in longitu-
dinal section is approximately conoidal. 65
From this point of greatest area towards
the outlet of the chamber the latter
narrows until, at the outlet it is much

contracted, so that the outlet from each chamber is of less area than the inlet thereto.

We will now describe our improvements with reference to the accompanying drawings, wherein:—

Figure 1. shows the pump drum, with our improvements in vertical longitudinal section.

Figure 2. is a cross section of Figure 1 on line $y-y$.

Figure 3 shows in vertical longitudinal section, a modification of the invention, and

Figure 4 shows a plan thereof.

In the above drawings, only the sides or discs of the pump drum are shown, with the improved arrangement of impellers. It is to be understood that the outer casing of the pump, the inlet for liquid, and driving means and other arrangements may be any usual.

Referring to the drawings Figures 1 and 2, 1, 1, are the discs of the impeller drum, on which are cast the vanes 2, which are referred to herein, for the purpose of the description, as the principal vanes. 3 indicate supplementary vanes, cast on or attached in any convenient manner to the principal vanes, these supplementary vanes being approximately at the angle shown in Figure 1. It will be noted that the position of these supplementary vanes is such that they form a shield against the static or head pressure during the pumping operation. 4, indicates the inlet point for liquid to the pump, the liquid entering chambers 5 formed by the two sides 1, 1, of the drum; by a principal vane and its supplementary vane; and by an adjacent principal vane.

The principal vanes are arranged as shown in the drawings the chord of the arc formed by each vane being tangential to the circular liquid inlet.

The cross sectional area of each chamber 5 increases from the point 6—6 to the point 7—7, where it is greatest, and from 7—7 it diminishes to the outlet 8. Liquid entering at 7—7 to any of the chambers has its kinetic flow transformed into pressure on its passage from point 7—7 to the outlet 8, where the liquid emerges under the head pressure, this transformation being effected by the configuration of that part of the chamber between points 7—7 and 8.

The arrangement of the supplementary vanes with reference to the principal vanes is preferably that shown in the

drawing, Figure 1, but the supplementary vanes may form continuations of the principal vanes and at the angle required.

In Figures 3 and 4 a modification is shown, in which each chamber 5 is provided with two outlets, the extra outlet being provided by dividing each supplementary vane at the point 9. The liquid under pressure in the chamber 5 is therefore split into two streams, one emerging under the head pressure through outlet 8, and the other through outlet 9.

The principal and supplementary vanes may be of any convenient metal, and may be cast on with one or both of the discs of the pump drum, or otherwise secured within the latter.

We do not confine ourselves to the exact angle shown between the principal and supplementary vanes, it may be varied with consequent increase or decrease of the sectional area of outlet 8, but the cross section of the latter or where two outlets 8 and 9 are provided—the total cross sectional area of said outlets 8 and 9 will always be less than the cross sectional area of the inlet to a chamber at point 6—6. From the foregoing description it will be also understood that the angle between the principal and supplementary vanes will vary with the number of impeller chambers in the pump drum.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A centrifugal pump drum of the vane impeller type characterised by the formation within the pump drum of impeller chambers gradually increasing in cross sectional area to about midway between the liquid inlet and outlet, and then decreasing in cross sectional area to an outlet of less area than the inlet to the chamber.

2. In a centrifugal pump drum of the vane impeller type principal vanes with supplementary vanes formed at an angle thereto in such a manner that liquid chambers are formed within the drum, the said chambers being approximately conoidal in longitudinal cross section, and the outlet to each chamber being of less area than the inlet thereto.

3. In a centrifugal pump drum of the vane impeller type principal vanes between the drum discs, and supplementary vane formed with each principal vane, the extremity of each supplementary vane approaching the extremity of the

next principal vane to form an outlet between them for the liquid impelled from the drum.

- 5 4. In a centrifugal pump drum of the vane impeller type principal vanes between the drum discs and supplementary vanes formed with each principal vane, the extremity of each supplementary vane approaching the extremity of
- 10 the next principal vane to form an outlet between them for the liquid impelled from the drum, and each supplementary

vane being divided near its outer extremity to form a further outlet.

5. A centrifugal pump impeller, constructed and arranged substantially as hereinbefore described and as illustrated by the accompanying drawings.

Dated this 6th day of April, 1920.

WILLIAM H. TAYLOR &

O'CONNELL,

3, Brown Street, Market Street,
Manchester,
Agents for the Applicants.

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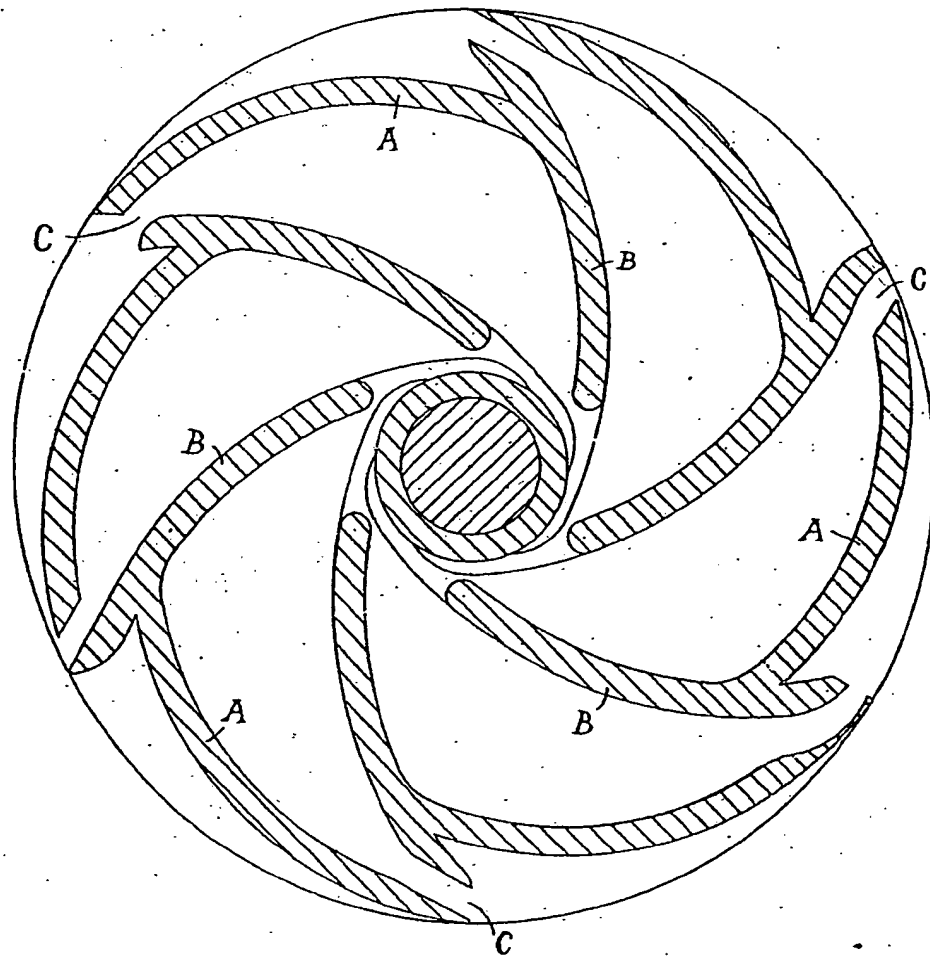
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160,474 PROVISIONAL SPECIFICATION

1 SHEET

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[This Drawing is a reproduction of the Original on a reduced scale]

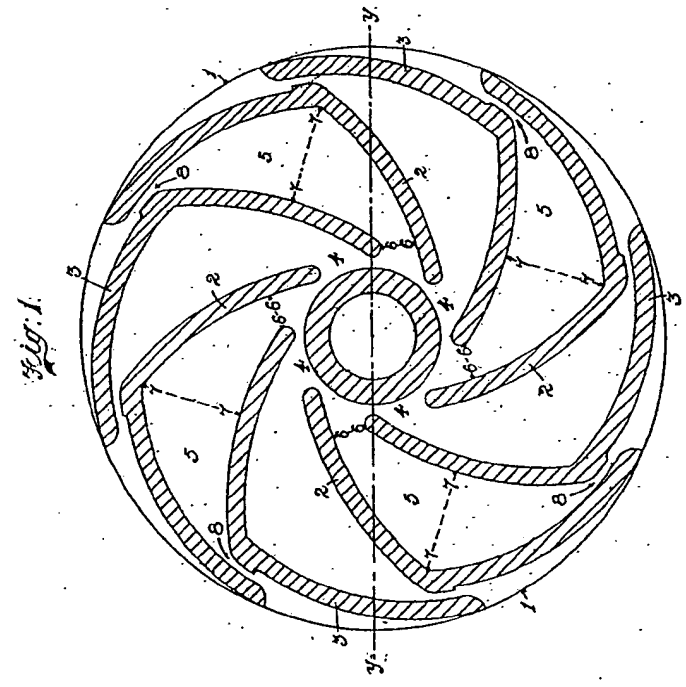


Fig. 1.

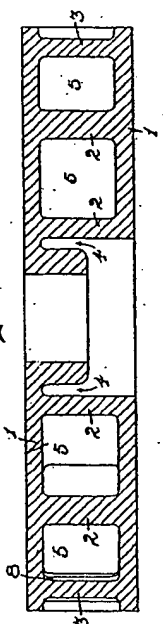


Fig. 2.

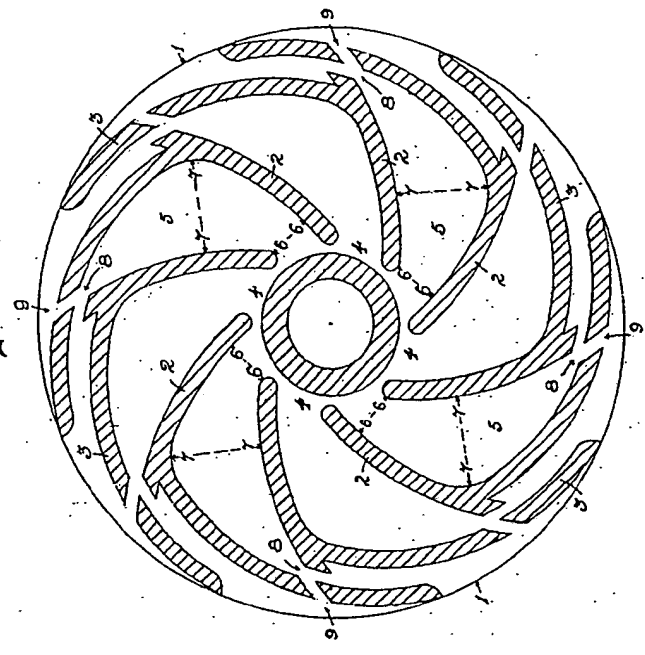


Fig. 3.

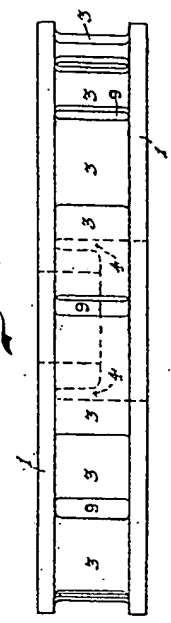


Fig. 4.

Fig. 1.

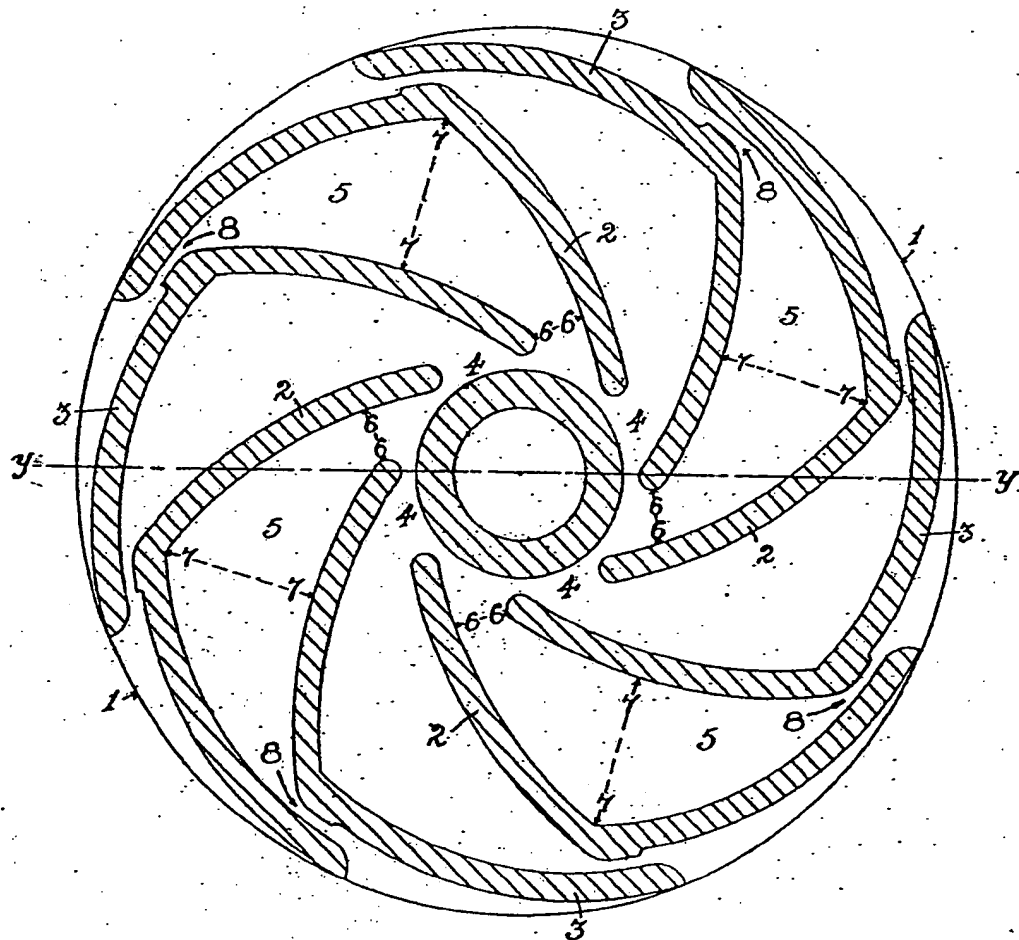
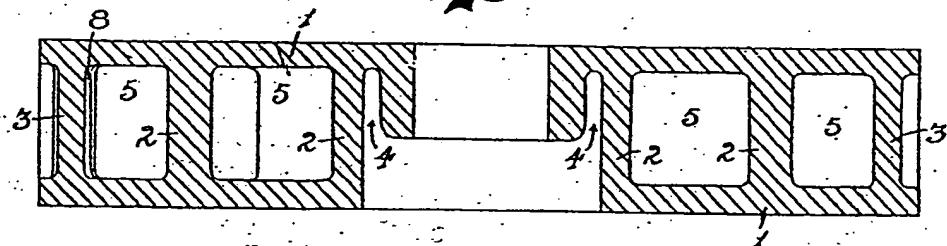


Fig. 2.



[This Drawing is a reproduction of the Original on a reduced scale]

Fig: 5.

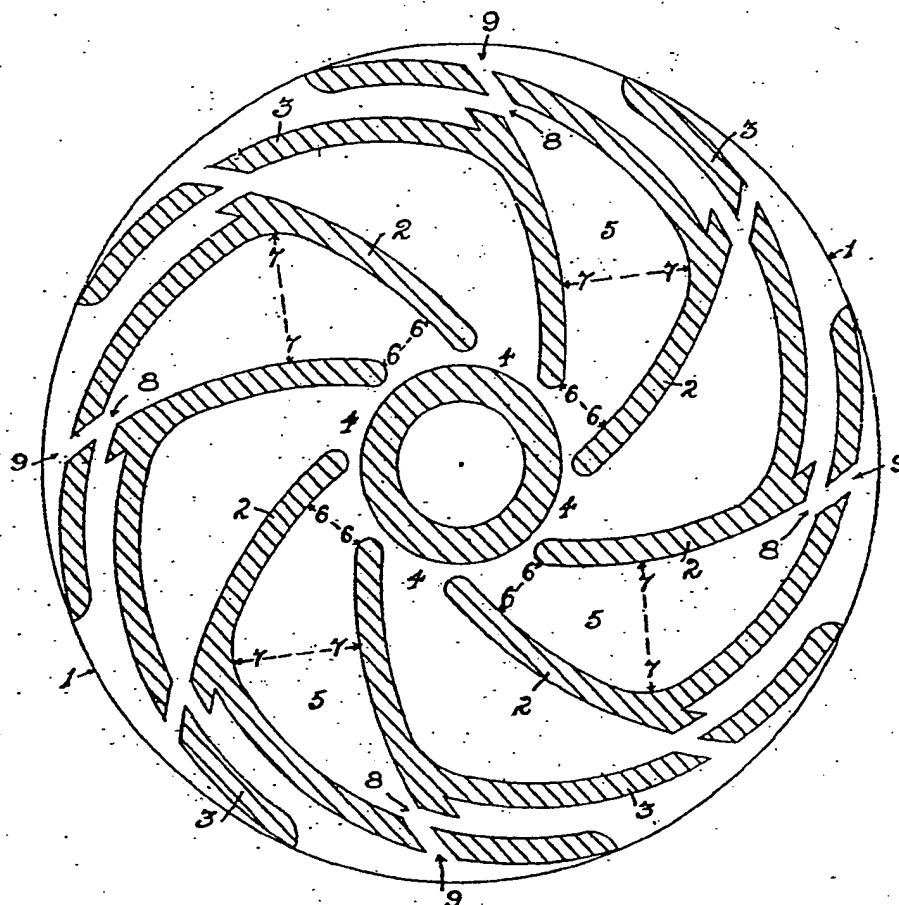
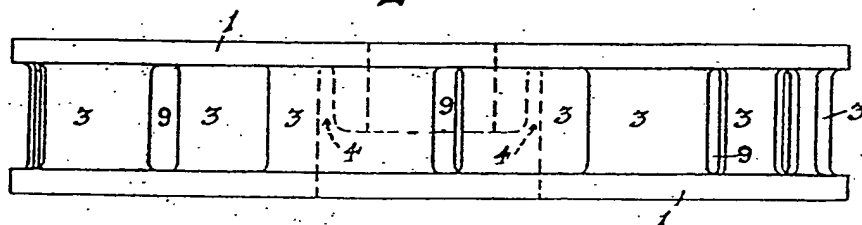


Fig:4.



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